ATTACHMENT J.4.31

SYSTEM OPERABILITY TESTING AND STARTUP AND TURNOVER PLAN

ED-12-6003

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SYSTEM OPERABILITY TESTING AND STARTUP AND TURNOVER PLAN

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Effective Date: August 12, 1996

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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RECORD OF ISSUE/REVISIONS

DATE	REV. NO	DESCRIPTION AND AUTHORITY
06/10/94	0	Issued document to describe how startup and system operability test will be performed. Initiated Joe Cupo.
05/13/96	1	Complete revision and formatted to be in compliance with MS-1001. Added requirements for system operability test, startup and turnover plan for facilities and projects in accordance with DOE O 430.1. Initiated by D. Lunsford.
08/12/96	2	Revised procedure to include IC96-047, dated June 10, 1996 and minor editorial updates. Initiated by Dexter Lunsford.

1.0 PURPOSE

The purpose of this procedure is to define the practices and methods to be used in accepting completed systems or projects from the Construction Functional Area and/or their subcontractors for Startup and Turnover to the Operations Functional Area and/or the Operable Unit (OU) Projects.

2.0 SCOPE

2.1 This procedure applies to systems or projects which have Systems, Structures, or Components (SSCs) that must undergo Construction Acceptance Testing (CAT) or Systems Operability Testing (SOT) prior to turnover to operations.

2.2 This procedure applies to projects that have been designated projects in accordance with EW-1001, "Project Operating Procedure - Project Management", and other projects as designated by senior management.

2.3 This procedure is implemented when Construction Acceptance Testing (CAT) has been complete in accordance with Construction procedure CT-3.6.1, "Punchlist/Construction Turnover/Final Acceptance.

3.0 REFERENCES

3.1 RM-0021, "Safety Performance Requirements Manual".

3.2 RM-0022, "FEMP Records Management Program Records, Management Users Manual".

3.3 RM-0025, "FERMCO Operational Readiness Manual".

3.4 RM-0032, "FEMP Records Management Program Administrative Procedures".

3.5 RM-0034, "Startup and Turnover Requirements Manual".

3.6 CT-3.6.1, "Punchlist/Construction Turnover/Final Acceptance".

3.7 EW-1001, "Project Operating Procedure - Project Management".

3.8 ED-12-5001, "Engineering Control of Project Documents".

3.9 ED-12-5002, "Engineering Design Change Processes".

3.10 MS-1001, "FERMCO Site Procedure System".

3.0 REFERENCES

3.11 MS-1002, "Control of Plans and Internal Requirement Documents".

3.12 OP-0004, "FERMCO Lockout/Tagout (Hazardous Energy and Material Control) Procedure".

4.0 RESPONSIBILITIES

4.1 Design Organization - Responsible for preparing performance and maintenance specifications for equipment/systems and providing test scheduling and arrangements for preliminary and final inspection.

4.2 S&H - Responsible for establishing the overall program guidelines for safety lockouts of systems during testing and providing any needed USQD/SE System Support.

4.3 Facility Owner - An assigned person within FERMCO who maintains the responsibility for the facility during its operations phase after turnover from construction. This responsibility is jointly shared by Operations, Maintenance, and Facility Owner.

4.4 Project Controls - Responsible for the scheduling of construction completion, testing, and project turnover. Establishing milestone schedules, construction status, trend analysis, progress graphs, and completing the system status report weekly.

4.5 Project Engineer (PE) - An engineer responsible for document preparation, coordination, and/or performance of engineering functions for a project. A signature by the Project Engineer indicates that the issues involved with USQ, CM, CP, and interdisciplinary reviews have been resolved. Assist in the preparation and review of CAT and SOT procedures. Assist the Startup Engineer with testing, processing, and rectification of discrepancies discovered during test.

4.6 Quality Control (QC) Representative - Responsible for providing surveillance for the test program to ensure compliance with the Test Plan Specifications and Procedures. Projects that require an Operational Readiness Review or a Readiness Assessment will require witness and sign-off by QC of CAT and SOT Test reports. Projects that are Standard Startup Reviews will only require QC to witness the test.

4.7 Test Coordinator - Responsible for the safe and proper conduct of the test. Also responsible for resolving any exceptions and/or nonconformances to minimize loss of testing time and expediting turnover to the Facility Owner.

4.8 Subcontractor (SC) - Provide input to punchlist, participate in walk downs, and complete punchlist items identified. Also provide input to CAT/SOT procedures and perform test when required by contract.

4.0 RESPONSIBILITIES

4.9 Startup Department - For facilities/systems requiring startup-testing, provide input to the design, punchlist, participate in walk downs, and take over care, custody, and control of the completed facilities/systems from the Construction Functional Area. These activities are performed in conjunction with Construction, Facility Owner, and the Operations Functional Area which includes operations and maintenance personnel.

5.0 GENERAL

5.1 The Startup Manual (RM-0034) provides the specific instructions for developing and executing a Startup Program. Use of this manual assures that the test activities and generated documentation complies with current requirements. It also provides evidence that the facility complies with the required criteria. The Startup Manual is a separate document.

5.2 All CAT/SOT requirements are to be developed and included in the Project Startup Plan.

5.3 A Startup Plan shall be prepared for projects and/or major modifications prior to turnover and provide the overall outline for placing the facility and/or systems in operations, beginning with acceptance from Construction, through Startup testing, and ending with release to operations.

5.4 The Startup Plan addresses the overall scheme for activation of a facility from construction turnover to final turnover to operations. The Startup Plan identifies the SSCs requiring CAT/ICAT or SOT. The plan shall provide the schedule for testing, identifying responsible persons, and establishing the lines of authority.

5.5 The Startup Plan shall be within the guidelines and format as outlined in RM-0034, "Startup and Turnover Requirements Manual."

5.6 At the direction of the Project Manager, the Performance/Quality Assurance function will schedule and perform an Operational Readiness Review (ORR), Readiness Assessment (RA) or a Standard Startup Reviews (SSR) in accordance with RM-0025, "FERMCO Operational Readiness Manual".

5.7 During the acceptance of small projects that do not have multiple systems, it is more feasible to perform Construction Acceptance Testing and Systems Operability Testing simultaneously. Therefore we refer to these tests as Integrated Construction Acceptance Testing. These test teams could have members from Construction, Subcontractors, Project Engineering, Startup, Operable Unit/Operations and various other persons as required. Sign off and witness by Quality Control will be as stated in paragraph 4.6 of this procedure.

6.0 PREREQUISITES

6.1 In those instances where Lockout and Tagouts must be exercised, Construction will provide this during the Construction Phase up to Construction Turnover. When the system or facility has been turned over to the Operable Unit, it will be the responsibility of the Operable Unit/Operations personnel to provide Lockout and Tagouts. See Reference 3.12.

6.2 Standard Operating Procedures (SOPs) used by the Operable Unit/Operations during normal facility operations shall require a "Peer" review by Startup and Turnover personnel that are assigned the project.

6.3 SOT procedures will be developed and revised in accordance with Site Procedure MS-1001, "FERMCO Site Procedure System." The Test Coordinator will develop project specific procedures for processing interim changes to SOT procedures during startup testing, adapting the ICP process described in MS-1001 to the project's requirements. No other requirements of MS-1001 will apply to project specific procedures.

Manuals and plans will be developed and revised in accordance with Site Procedure MS-1002, "Control of Plans and Internal Requirements Documents."

6.4 A joint group can perform ICAT/SOT Startup processes in lieu of CAT and SOT if the ICAT/SOT procedure have the same performance parameters that these processes have to system operability.

6.5 Applicable equipment that is used for SOT shall be calibrated by trained personnel using approved procedures. Components calibrated will be tagged as to date it was calibrated and the due date for next calibration.

6.6 Component documents and records (i.e. weld inspection records, welder certification records, checklist, calibration records, etc.) shall be verified by Quality Control as complete, accurate, up to date and acceptable prior to the beginning of any testing.

7.0 PROCEDURE

7.1 INITIATION OF STARTUP AND TURNOVER

Project Manager

1. Notify the EE Startup and Turnover Manager that a facility, as a result of conceptual and preliminary design, has been designated a project in accordance with Paragraph 2.2 of this procedure.

7.0 PROCEDURE

7.1 INITIATION OF STARTUP AND TURNOVER

*NOTE: **This is necessary so the Startup and Turnover engineers are able to coordinate startup interface requirements with the Design Engineers. At the very latest, the startup and turnover efforts should be initiated in time to coordinate with construction personnel for the scheduling and tracking of punchlist items to completion. This will allow the Startup and Turnover Plan to be initiated, review and approval of CAT and/or SOT procedures. Also schedule and develop Startup and Turnover requirements prior to completion of Construction Acceptance Testing (CAT) and/or acceptance from subcontractor.***

Manager Startup and Turnover Department

2. Coordinate closely with the Project Manager, Project Engineer, Construction Manager to accomplish the following:

   - Determine the scope and complexity of testing required.
   - Review project schedules and budget to be met by the Startup and Turnover Department.
   - Assign Startup and Turnover personnel to the project to support the Project Manager in completion of projects and turnover to the operating unit.
   - Initiate action to get CAT or SOT procedures generated for review by Project Engineer and others as required.
   - Appoint an individual from Startup and Turnover Department to be the lead in startup and turnover activities, and the Test Coordinator for the project.
   - Coordinate with Project Manager on his decision on what level of a readiness assessment he will require for the project using the requirements outlines in RM-0025, "FERMCO Operational Readiness Manual".

Project Startup and Turnover Team

3. Initiate a Startup Plan per requirements of RM-0034, "Startup and Turnover Requirements Manual".

4. Startup Plan will be routed to the Project Manager, Engineering Manager, Construction Manager, Project Engineer, Project Quality Assurance representative, Project Safety and Health representative, Facility Manager, Operations Manager for their review and comments.

7.0 PROCEDURE

7.1 INITIATION OF STARTUP AND TURNOVER

Project Startup and Turnover Team

5. Resolve comments with the respective reviewers in accordance with Site procedures, incorporate changes as required, and send to the persons who sign the document for final approval.

    - As a minimum, the following persons shall sign the approval sheet for the Startup Plan:

        - Project Manager
        - Project Engineer
        - Construction Manager
        - Operations Manager
        - Startup and Turnover Manager/Engineer

6. Send Startup Plan to Engineering Document Control (EDC) for their controlled issuance in accordance with ED-12-5001, "Engineering Control of Project Documents.".

7. Provide EDC with a distribution list for the distribution of the Startup Plan, as a minimum, to the signatories.

8. For revisions to the Startup Plan use requirements of MS-1002,"Control of Plans and Internal Requirements Documents".

9. Provide technical support, as required, to execute the requirements of the Startup Plan. Typical activities include the following:

    - Coordinate and oversee the performance of SOT to ensure compliance with overall startup schedule, test procedures, and witnessing by appropriate departments.

    - Ensure that project documentation that has been generated as a result of Startup and Turnover, has been signed and retained as Project Documents.

    - Notify the Project Manager (PM) of any deficiencies and/or discrepancies that would prevent a state of readiness to meet project schedule.

    - Support the Project Manager during the performance of ORRs, RAs, Standard Startup Reviews, as required.

7.2 INITIATION OF SOT

Startup and Turnover Engineer

1. When the Project Manager and Construction Manager have declared that construction is complete and a walkdown has been conducted by Construction, Subcontractor (if required), Project Engineer, Quality Assurance, Startup and Turnover, and Operations personnel, a punchlist should be initiated that identifies the discrepancies/deficiencies.

    - This punchlist is then completed and signed off by Construction/Subcontractor, and Performance/Quality Assurance.

2. A final walkdown is performed to determine that all deficiencies/discrepancies identified on punchlist have been completed in a proper manner to meet the intent of the design.

3. The Test Coordinator (TC) shall develop test documents to be used in SOT and be the technical lead in executing these test activities for the Project.

4. Review and determine that SOT procedures have the proper approvals and are controlled in accordance with ED-12-5001, "Engineering Control of Project Documents".

5. Notify the support personnel, to include persons responsible for plant operations that SOT activities are being performed and they should be part of activity.

Test Coordinator

6. At this time, SOT can be initiated and all parties concerned should be present. This includes, as a minimum, Construction, Project Manager, Project Engineering, Startup and Turnover and Operations. SOT shall be performed in accordance with approved procedures. These procedures outline steps and test to be performed and each criteria shall be signed off by Test Coordinator, dated, and witnessed or verified per requirements of paragraph 4.6 of this procedure.

7. Coordinate with the Startup and Turnover Engineer and Project Engineers to establish the following:

    - Project schedules and budgets to be met by SOT.

    - Designate boundaries of the test to be performed.

    - Identification of personnel that will assist and coordinate their activities with the Test Coordinator.

    - Train the test team members as well as the support personnel in the execution of the SOT activities.

7.0 PROCEDURE

7.2 INITIATION OF SOT

Startup and Turnover Engineer

*NOTE: **Site Procedure ED-12-5002, "Engineering Design Change Processes" and ED-12-4010, "Design Verification" will be used if modifications to the design and/or system is required to validate operability.***

8. All Test Documents and Records shall be assembled by the Test Coordinator to include the results of test on any deficiencies and/or discrepancies in performance of test or results of tests. See Section 8.0, Records, for disposition.

8.0 RECORDS

8.1 Records generated as indicated in paragraph 8.2 shall be retained, archived and dispositioned in accordance with RM-0032, "FEMP Records Management Program Records, Management Users Manual" and RM-0032, "FEMP Records Management Program Administrative procedures".

8.2 The following categories of records are documents that could be included in test packages, turnover packages, and/or one lined as a result of the completion of a project.

They may include but are not limited to the following:

- Compliance with specifications and drawings.
- Functional Operating Test
- Acceptance Documents
  - Turnover to Operations
  - Turnover to Facility Manager
- Hydrostatic Test Results
- Flushing Sample Reports
- Electrical Tests (e.g. Meggar and Motor Rotation)
- Pneumatic Pressure Tests
- Redline Drawings (i.e. electrical & mechanical as-builts)
- Ventilation Balancing Reports
- HEPA Filter Tests
- Machinery Vibration and Alignment Data Sheets
- Vendor Manuals for furnished equipment
- Non-Destructive Tests (e.g. Pipe Weld Dye Penetrant Tests)
- QC Reports
- Overhead Crane Load Test Reports.
- Instrument Calibrations/Loop Check
- Control Circuit Checkout

8.0 RECORDS

- Rotating Equipment Vibration
- Centrifugal Pump Checkout
- MOV, AOV limit switch adjustment
- Flow Balancing/Verification
- Equipment Lubrication
- Project Property Reports

9.0 DRIVERS

9.1 DOE O 430.1, "Life Cycle Asset Management", Paragraph 6.e.7(C)

9.2 RM-0012, "Quality Assurance Program Description".

9.3 RM-0016, "Management Plan - FERMCO Policies and Requirements Manual".

10.0 DEFINITIONS

10.1 Construction Acceptance Testing (CAT) - Test performed by a construction subcontractor or FERMCO to ensure that components and items have been furnished, installed and will operate satisfactorily and safely in accordance with parameters established by approved drawings and specifications. Such tests may include, but are not limited to, hydrostatic, pneumatic, flow, electrical, ventilation, mechanical functioning, load, soils, water quality, nondestructive and run in tests.

10.2 Facility Owner - The FERMCO organization assigned the responsibility for the final care, custody, and control of the facility and/or system(s) being constructed or modified, usually Operations or Projects/Operable Units.

10.3 Integrated Construction Acceptance Testing (ICAT) - Acceptance testing of components within a system to ensure it operates as designed. ICAT Testing may be documented and utilized as a SOT if all test parameters are met and remain the same.

10.4 Maintaining - Is the act of keeping in an existing state, such as repair, efficiency, or validity, through the care, custody and control of the System, Structure or Component (SSC).

10.5 Punchlist - A record document for tracking incomplete work required for construction close-out and the subsequent completion of that work.

10.6 Startup - The formal activities involved with equipment and system testing, conducted to assure that the equipment and systems have been properly designed, constructed, or modified, and are ready to operate safely, and in a way that will not endanger life or property.

10.0 DEFINITIONS

10.7 System Operability Test (SOT) - Testing imposed on a facility or system to verify that the performance of a system meets or exceeds design specifications; optimize operating parameters; identify problems that must be corrected prior to production operations.

10.8 Turnover Package - A document package that contains all Construction furnished documentation required for the completion, checkout, testing, start-up, and initial operations of each system or facility as agreed upon during turnover meetings.

10.9 Walkdown - A field verification, by individuals or groups, using approved drawings and specifications, to check that a facility or system(s) are installed or constructed/modified as designed and intended.